

Claims:

1. A method for processing a dielectric film, comprising:
depositing a photoresist on the dielectric film; and
removing the photoresist using a plasma comprising hydrogen and water.
2. The method of claim 1, wherein the hydrogen is supplied at a flow rate between about 1000 sccm and about 5000 sccm and the water is supplied at a flow rate between about 10 sccm and about 1000 sccm.
3. The method of claim 1, wherein the plasma is maintained at a temperature between about 150°C and 450°C.
4. The method of claim 1, wherein the plasma is maintained at a power between about 500 W and 3000 W.
5. The method of claim 1, wherein the dielectric film is exposed to the plasma for between about 30 seconds and 180 seconds.
6. A method for processing a low-k film, comprising:
depositing a photoresist on the low-k film;
patterning the photoresist;
etching the photoresist; and
removing a residue of the photoresist using a plasma comprising hydrogen and water.
7. The method of claim 6, wherein the hydrogen is supplied at a flow rate between about 1000 sccm and about 5000 sccm and the water is supplied at a flow rate between about 10 sccm and about 1000 sccm.
8. The method of claim 6, wherein the plasma is maintained at a temperature between about 150°C and 450°C.

9. The method of claim 6, wherein the plasma is maintained at a power between about 500 W and 3000 W.
10. The method of claim 6, wherein the low-k film is exposed to the plasma for between about 30 seconds and 180 seconds.
11. The method of claim 6, further comprising exposing the low-k film to the hydrogen and water plasma maintained at a power between 100 W and 1000 W after removing the residue.
12. The method of claim 11, wherein the low-k film is exposed to the plasma at a power between 100 W and 1000 W for a period of about 30 seconds to 240 seconds.
13. The method of claim 6, wherein a portion of the photoresist is removed using a plasma comprising oxygen.
14. The method of claim 13, wherein the oxygen plasma is supplied at a flow rate between about 100 sccm and 1000 sccm.
15. The method of claim 13, wherein the oxygen plasma is biased between about 50 W and 500 W.
16. The method of claim 13, wherein the oxygen plasma is maintained at a temperature between about 0°C and 100°C.
17. The method of claim 13, wherein the oxygen plasma is a downstream oxygen plasma.
18. The method of claim 17, wherein the oxygen plasma is supplied at a flow rate between about 1000 sccm and 5000 sccm.
19. The method of claim 17, wherein the downstream oxygen plasma power is between about 500 W and 3000 W.

20. The method of claim 17, wherein the oxygen plasma is maintained at a temperature between about 150°C and 450°C.
21. The method of claim 17, wherein the plasma for removing photoresist further comprises nitrogen.
22. The method of claim 21, wherein the nitrogen is about 5-30% of the total plasma volume.
23. The method of claim 13, further comprising exposing the low-k film to the hydrogen and water plasma maintained at a power between 100 W and 1000 W after removing the residue.
24. The method of claim 23, wherein the low-k film is exposed to the hydrogen and water plasma for a period of about 30 seconds to 240 seconds.
25. The method of claim 6, further comprises removing an etch by-product after etching the photoresist.
26. The method of claim 25, wherein the etch by-product is removed using a plasma comprising a fluorine containing gas.
27. The method of claim 26, wherein the fluorine containing gas is selected from the group consisting of CF_4 , CH_3F , CHF_3 , CH_2F_2 , C_2F_6 , C_4F_8 , C_3F_8 , NF_3 , and combinations thereof.
28. The method of claim 26, wherein the plasma for etch by-product removal further comprises hydrogen and water.
29. The method of claim 26, wherein the plasma for etch by-product removal further comprises oxygen.
30. The method of claim 29, wherein the fluorine containing gas is between about 0.1% and about 10% of the total plasma volume.

31. The method of claim 25, wherein the etch by-product is removed using soft bias.
32. The method of claim 31, wherein the soft bias comprises maintaining a power between about 100 W and 1000 W.
33. The method of claim 31, wherein the soft bias is maintained at a temperature between about 0°C and about 100°C.
34. The method of claim 31, wherein the soft bias is maintained at a pressure between about 500 mT and 5000 mT.
35. The method of claim 25, wherein the plasma is a downstream plasma.
36. The method of claim 25, further comprising exposing the low-k film to the hydrogen and water plasma mixture maintained at a power between 100 W and 1000 W after residue removal.
37. The method of claim 36, wherein the low-k film is exposed to the hydrogen and water plasma mixture for a period of about 30 seconds to 240 seconds.
38. The method of claim 6, further comprises treating the low-k film after removing the residue.
39. The method of claim 38, wherein removing the photoresist, removing the residue, and treating the low-k film are performed in one step using the hydrogen and water plasma mixture.
40. The method of claim 39, wherein the hydrogen is supplied at a flow rate between about 1000 sccm and about 10,000 sccm and the water is supplied at a flow rate between about 10 sccm and about 1000 sccm.
41. The method of claim 39, wherein the plasma is maintained at a temperature between about 150°C and 450°C.

42. The method of claim 39, wherein the plasma is a downstream plasma.
43. The method of claim 42, wherein the downstream plasma is maintained at a power between about 500 W and 3000 W.
44. The method of claim 39, wherein the low-k film is exposed to the plasma for between about 30 seconds and 180 seconds.